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Conference Abstract

The Global Caryophyllales Initiative: Towards an updated taxonomic backbone and a dynamic monograph of a major plant group

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Abstract

The ongoing paradigm shift in taxonomy from individual contributions to a truly collaborative and forward-looking endeavour results in a number of challenges related to distributed data management. Examination of physical specimens remains a key task, but searching for specimen data, literature, and name information is now mostly done online. In the past, these research steps involved many physical visits to collections and libraries. Although these infrastructures were and are still freely accessible and supportive for research carried out by individuals, the amount of characters, specimens, and the complexity of current analytical approaches limit what can be achieved by individual workers. Monographing is challenged because:

1. larger genera remain unstudied and become fragmented in regional treatments;
2. long-term availability of detailed (unpublished) primary research data is often not addressed;
3. cross-disciplinary interoperability and open data principles are needed; and
4. highly specialised techniques used in phylogenetic and genomic analyses require teamwork by specialists.

The process towards generating truly community-based integrative dynamic taxonomic treatments is ongoing. In botany, specialist communities and networks have formed for certain plant groups, for example in the families Solanaceae, Brassicaceae, Fabaceae, Poaceae, Melastomataceae-Miconieae, Asteraceae-Cichorieae, and in the order Caryophyllales. Their common aim is to create sustainable information systems according to the FAIR principles, making the information Findable, Accessible, Interoperable and Reusable. At the same time, the information system is meant to support and document ongoing taxonomic research as an iterative process with tracking of changes, and backlinks to original data sources. This represents a big step forward with respect to the efficiency of the entire field of taxonomy.

The Global Caryophyllales Initiative aims at creating a global synthesis of species diversity in this group (Borsch et al. 2015) encompassing about 12,500 species in more than 30 families or about 6% of flowering plants (Fig. 1). Caryophyllales include ecologically diverse, economically important, invasive, and threatened species. The Caryophyllales Network was initiated in 2011 and unites specialists from across the world (to date, 150

scientists from 37 countries). The network is recognized by the World Flora Online (WFO) Council as its Taxonomic Expert Network for Caryophyllales.

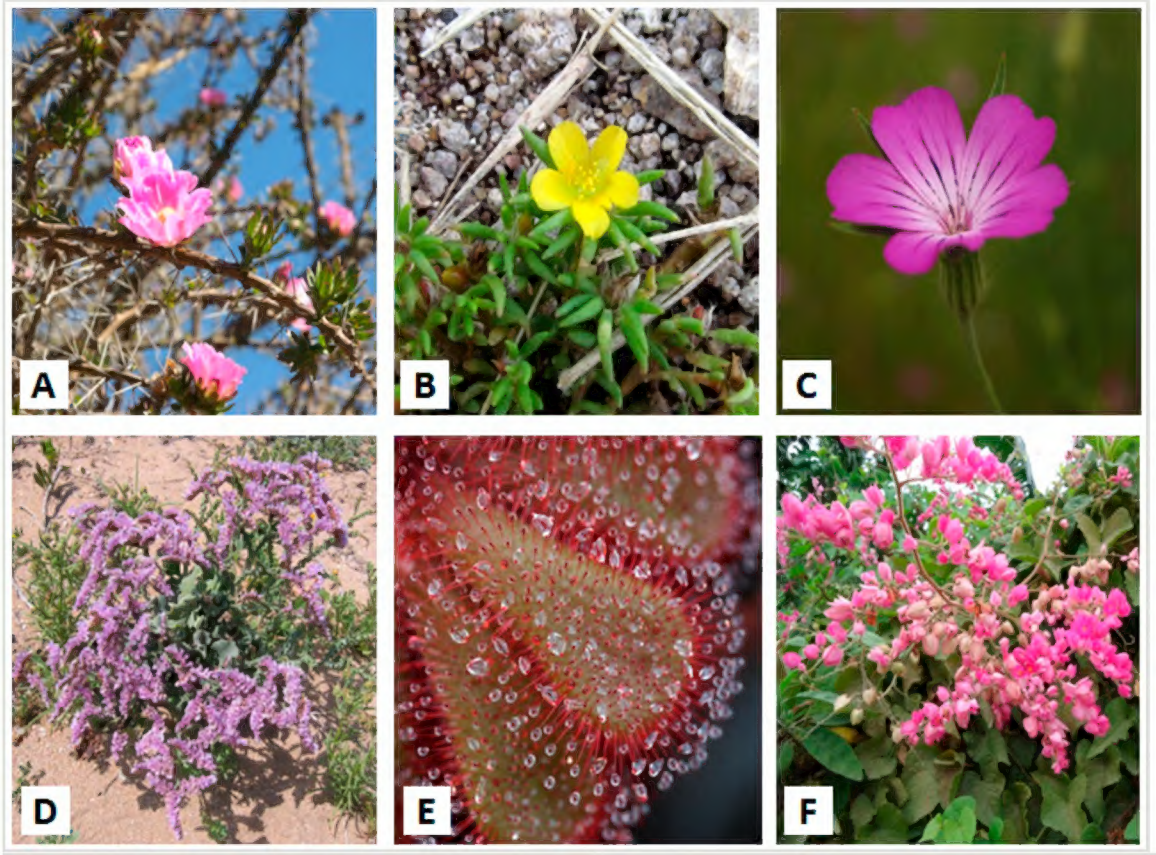

Figure 1.

Caryophyllales diversity: Examples shown are *Pereskia sacharosa* Griseb. (Cactaceae), *Portulaca mexicana* P.Wilson (Portulacaceae), *Agrostemma githago* L. (Caryophyllaceae), *Limonium mucronatum* (L.f.) Chaz. (Plumbaginaceae), *Drosera aliciae* Raym.-Hamet. (Droseraceae), and *Antigonon leptopus* Hook. & Arn. (Polygonaceae). Photographs: B. Schlumpberger (A), G. Ocampo (B), N. Korotkova (C-E), I. Castañeda-Noa (F).

Advances by the network are presented in the open-access Caryophyllales Portal (http://caryophyllales.org/), aiming to provide up-to-date phylogenetic and taxonomic information. The systematic treatment is powered by the EDIT Platform for Cybertaxonomy (https://cybertaxonomy.eu/), with the generic checklist (http://caryophyllales.org/Checklist) and some family treatments already publicly available (e.g. Cactaceae). The checklist is regularly updated in consultation with family editors. A species-level taxonomic backbone incorporating all names and pertinent nomenclatural acts and evaluations is being compiled. A compilation of the Nepenthaceae (Berendsohn et al. 2018) served as a case study for the accommodation of descriptive and other factual data, and for demonstrating the feasibility of the workflow contributing to the WFO initiative. The taxonomic treatment of *Iresine* (Borsch et al. 2018) is another example. These studies are fundamental in establishing a general workflow for collaborative online monographs.

Several challenges remain, *inter alia* the genomics perspective in biodiversity informatics, proper attribution and unique identification of taxonomic concepts, review and impact assessment of individual contributions, possibilities to simultaneously display contrasting taxonomical concepts and classifications, and engaging both the wider taxonomic community and the public.

The ongoing implementation shows that a dynamic online monograph requires rethinking of editorial workflows. Based on experiences with the Caryophyllales network, the taxonomic and biodiversity informatics communities are ready to meet this challenge.

Presenting author

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